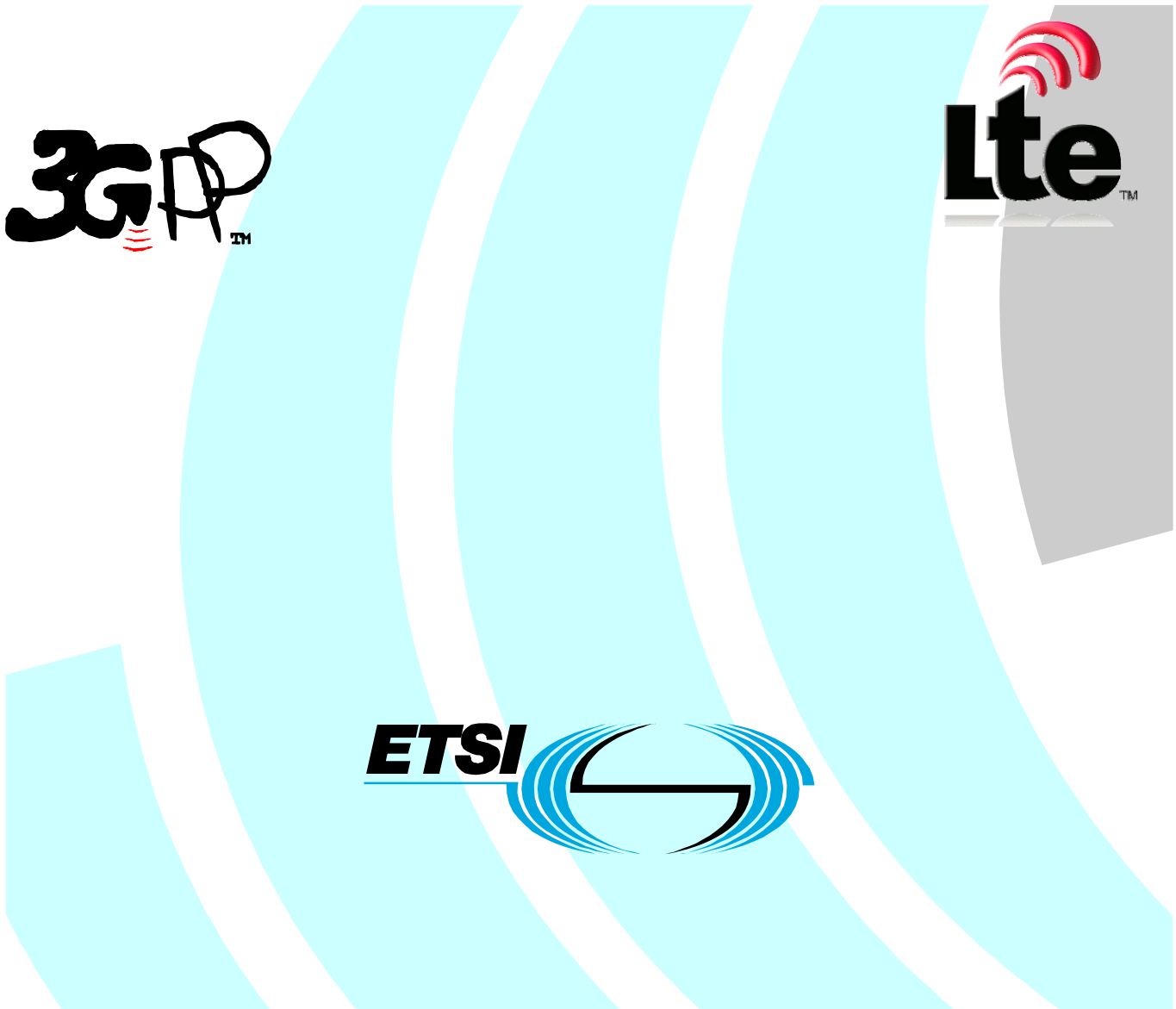
ETSI TS 129 280 V8.2.0 (2009-10)

Technical Specification

Universal Mobile Telecommunications System (UMTS);
LTE;
Evolved Packet System (EPS);
3GPP Sv interface (MME to MSC, and SGSN to MSC)
for SRVCC
(3GPP TS 29.280 version 8.2.0 Release 8)



Reference
RTS/TSGC-0429280v820

Keywords
LTE, UMTS

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (http://webapp.etsi.org/IPR/home.asp).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

This Technical Specification (TS) has been produced by ETSI 3rd Generation Partnership Project (3GPP).

The present document may refer to technical specifications or reports using their 3GPP identities, UMTS identities or GSM identities. These should be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between GSM, UMTS, 3GPP and ETSI identities can be found under http://webapp.etsi.org/key/queryform.asp.

Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document describes the Sv interface between the Mobility Management Entity (MME) or Serving GPRS Support Node (SGSN) and 3GPP MSC server enhanced for SRVCC. Sv interface is used to support Inter-RAT handover from VoIP/IMS over EPS to CS domain over 3GPP UTRAN/GERAN access or from UTRAN (HSPA) to 3GPP UTRAN/GERAN access.

If there is no specific indication, the term "MSC server" denotes 3GPP MSC server enhanced for SRVCC as defined in 3GPP TS 23.216 [2].

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TR 23.216: "Single Radio Voice Call Continuity (SRVCC)".

[3] 3GPP TS 29.274: "Evolved GPRS Tunnelling Protocol for Control Plane (GTPv2-C)".

[4] 3GPP TS 23.003: "Numbering, addressing and identification".

[5] 3GPP TS 23.007: "Restoration Procedures".

[6] 3GPP TS 33.401: "3GPP System Architecture Evolution (SAE): Security architecture".

[7] 3GPP TS 24.008: "Mobile radio interface Layer 3 specification; Core network protocols; Stage 3".

[8] 3GPP TS 48.008: "Mobile Switching Centre – Base Station System (MSC - BSS) interface; Layer 3 specification".

[9] 3GPP TS 25.413: "UTRAN Iu interface Radio Access Network Application Part (RANAP) signalling".

[10] 3GPP TS 33.102: "3G Security; Security architecture".

[11] 3GPP TS 29.002: "Mobile Application Part (MAP) specification; Stage 3".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

3.2 Symbols

For the purposes of the present document, the following symbols apply:

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

STN-SR Session Transfer Number for SRVCC: see 3GPP TS 23.003 [4].
MME/SGSN MME or SGSN.

4 General Description

This document describes the Sv interface related procedures, message parameters and protocol specifications. The Sv messages are based on GTP. The message format, IE coding, and protocol error handling for Sv is per GTP as specified in 3GPP TS 29.274 [3].

5 Sv Messages and Information Elements

5.1 Introduction

The Sv application defines a set of messages between the MME/SGSN and MSC Server to provide SRVCC as defined in 3GPP TS 23.216 [2]. The Sv message header is defined in 3GPP TS 29.274 [3]. The messages to be used and the information elements are described in the following sections.

5.2 Sv Messages

5.2.1 General

Sv Message Type value is defined in 3GPP TS 29.274 [3]. The message format is coded as per GTP in 3GPP TS 29.274 [3].

Table 5.2.1: Message types for Sv interface

Message Type value (Decimal)	Message	Reference
0	Reserved	3GPP TS 29.274 [3]
1	Echo Request	3GPP TS 29.274 [3]
2	Echo Response	3GPP TS 29.274 [3]
3	Version Not Supported Indication	3GPP TS 29.274 [3]
4-24	Reserved for S101 interface	3GPP TS 29.274 [3]
25	SRVCC PS to CS Request	5.2.2
26	SRVCC PS to CS Response	5.2.3
27	SRVCC PS to CS Complete Notification	5.2.4
28	SRVCC PS to CS Complete Acknowledge	5.2.5
29	SRVCC PS to CS Cancel Notification	5.2.6
30	SRVCC PS to CS Cancel Acknowledge	5.2.7
31	For future Sv interface use	-
32-255	Reserved for GTPv2	3GPP TS 29.274 [3]

5.2.2 SRVCC PS to CS Request

A SRVCC PS to CS Request message shall be sent across Sv interface from the MME/SGSN to the target MSC server as part of the MME/SGSN SRVCC procedure in 3GPP TS 23.216 [2].

Table 5.2.2 specifies the presence requirements and conditions of the IEs in the message.

Table 5.2.2: Information Elements in a SRVCC PS to CS Request

Information elements	P	Condition / Comment	IE Type	Ins.
IMSI	M	None	IMSI	0
MME/SGSN Sv Address for Control Plane	M	This IE specifies the address for control plane message which is chosen by the source MME/SGSN	IP-Address	0
MME/SGSN Sv TEID for Control Plane	M	This IE specifies the tunnel for control plane message which is chosen by the source MME/SGSN. The target MM shall include this TEID in the GTP header of all related control plane messages which are related to the requested bearer.	TEID-C	0
MSISDN	M	The MME/SGSN shall include MSISDN IE	MSISDN	0
STN-SR	M	The MME/SGSN shall include STN-SR IE	STN-SR	0
MM Context for E-UTRAN SRVCC	C	The MME shall include mobile station classmarks, supported codecs, and CS Security key in MM Context for SRVCC for E-UTRAN SRVCC. The derivation of the CS security keys shall follow the procedures defined 3GPP TS 33.401[7].	MM Context for E-UTRAN SRVCC	0
MM Context for UTRAN SRVCC	C	The SGSN shall include mobile station classmarks, supported codecs, and CS Security key in MM Context for SRVCC for UTRAN (HSPA) SRVCC. The derivation of the CS security keys shall follow the procedures defined 3GPP TS 33.102[Z].	MM Context for UTRAN SRVCC	0
Source to Target Transparent Container	M	The MME or SGSN shall include Source to Target Transparent Container IE	Source to Target Transparant Container IE	0
Target RNC ID	C	This IE shall be used to identify the target access for SRVCC handover to UTRAN (note 1).	Target RNC ID	0
Target Cell ID	C	This IE shall be used to identify the target access for SRVCC handover to GERAN (note 1).	Target Global Cell ID	0
Private Extension	O	None	Private Extension	VS
NOTE1: Based upon the SRVCC Handover procedure, either Target RNC ID or Target Cell ID shall be present in this message				

5.2.3 SRVCC PS to CS Response

A SRVCC PS to CS Response message shall be sent across Sv interface as a response to SRVCC PS to CS Request by the MSC server during SRVCC procedure in 3GPP TS 23.216 [2].

Table 5.2.3 specifies the presence requirements and conditions of the IEs in the message.

Cause IE indicates if the SRVCC PS to CS request has been accepted, or not. The request has not been accepted by the target MSC server if the Cause IE value differs from "Request accepted".

Table 5.2.3: Information Elements in a SRVCC PS to CS Response

Information elements	P	Condition / Comment	IE Type	Ins.
Cause	M		Cause	0
SRVCC rejected Cause	O	This IE may be sent if Cause value is differs from "Request accepted". MSC Server may include additional information to indicate the reason for rejecting SRVCC PS to CS request	SRVCC Cause	0
MSC Server Sv Address for Control Plane	O	If the Cause IE contains the value" Request accepted", the target MSC server may include MSC server Sv Address for Control Plane IE in SRVCC PS to CS Response message if target MSC Server decides to use different IP address for the subsequent communication. The source MME/SGSN shall store this MSC server address and use it when sending subsequent control plane messages to this GTP-C tunnel.	IP Address	0
MSC Server Sv TEID for Control Plane	C	The target MSC server shall include MSC server Sv Tunnel Endpoint Identifier for Control Plane IE in SRVCC PS to CS Response message if the Cause IE contains the value "Request accepted". The source MME/SGSN shall include this TEID-C in the GTP-C header of all subsequent uplink control plane messages from the source MME/SGSN to the target MSC servers.	TEID-C	0
Target to Source Transparent Container	C	If the Cause IE contains the value "Request accepted ", this IE is included to carry the Handover command from the target access network.	Target to Source Transparant Container IE	0
Private Extension	O	None	Private Extension	VS

5.2.4 SRVCC PS to CS Complete Notification

A SRVCC PS to CS Complete Notification message shall be sent across Sv interface to the source MME/SGSN to indicate the SRVCC handover with CS Domain has been successfully finished during SRVCC procedure in 3GPP TS 23.216 [2].

Table 5.2.4 specifies the presence requirements and conditions of the IEs in the message.

Table 5.2.4: Information Elements in a SRVCC PS to CS Complete Notification

Information elements	P	Condition / Comment	IE Type	Ins.
IMSI	M	None	IMSI	0
Private Extension	O	None	Private Extension	VS

5.2.5 SRVCC PS to CS Complete Acknowledge

A SRVCC PS to CS Complete Acknowledge message shall be sent across Sv interface as a response to SRVCC PS to CS Complete Notification during SRVCC handover with CS Domain in 3GPP TS 23.216 [2].

Table 5.2.5 specifies the presence requirements and conditions of the IEs in the message.

Table 5.2.5: Information Elements in a SRVCC PS to CS Complete Acknowledge

Information elements	P	Condition / Comment	IE Type	Ins.
Cause	M	None	Cause	0
Private Extension	O	None	Private Extension	VS

5.2.6 SRVCC PS to CS Cancel Notification

A SRVCC PS to CS Cancel Notification message shall be sent across Sv interface from the MME/SGSN to the target MSC server to request the cancellation of an ongoing SRVCC handover.

Table 5.2.6 specifies the presence requirements and conditions of the IEs in the message.

Table 5.2.6: Information Elements in a SRVCC PS to CS Cancel Notification

Information elements	P	Condition / Comment	IE Type	Ins.
IMSI	M	None	IMSI	0
Cancel Cause	M	MME/SGSN indicates the reason for Handover cancellation	SRVCC Cause	0
Private Extension	O	None	Private Extension	VS

5.2.7 SRVCC PS to CS Cancel Acknowledge

A SRVCC PS to CS Cancel Acknowledge message shall be sent across Sv interface as a response to SRVCC PS to CS Cancel Notification.

Table 5.2.7 specifies the presence requirements and conditions of the IEs in the message.

Table 5.2.7: Information Elements in a SRVCC PS to CS Cancel Acknowledge

Information elements	P	Condition / Comment	IE Type	Ins.
Cause	M	None	Cause	0
Private Extension	O	None	Private Extension	VS

5.3 Path Management Messages

5.3.1 Introduction

The following GTP-C v2 messages support path management for the Sv interface:

- Echo Request
- Echo Response
- Version Not Supported

These messages are defined for GTP-Cv2 and the handling and definition shall also be as defined in GTP-Cv2, see 3GPP TS 29.274 [3].

5.3.2 Echo Request message

3GPP TS 29.274 [6] specifies the information elements included in the Echo Request message.

5.3.3 Echo Response message

3GPP TS 29.274 [3] specifies the information elements included in the Echo Response message.

5.3.4 Version Not Supported message

3GPP TS 29.274 [3] specifies the detailed handling and information elements included in the Version Not Supported message.

5.4 Reliable Delivery of Signalling Messages

This is performed as according to GTPv2 in 3GPP TS 29.274 [3].

5.5 Error Handling

This is performed as according to GTPv2 in 3GPP TS 29.274 [3].

5.6 Restoration and Recovery

This is performed as according to GTPv2 in 3GPP TS 23.007 [5].

6 Sv Information Elements

6.1 General

IE type value used in Sv Message is defined in TS 29.274 [3]. The IE format is coded as per GTP in TS 29.274 [3].

Table 6.1 shows the IEs used for SRVCC. Within information elements, certain fields may be described as spare. These bits shall be transmitted with the value set to 0. To allow for future features, the receiver shall not evaluate these bits.

Table 6.1-1: Information Elements for SRVCC

IE Type value (Decimal)	Information elements	Comment / Reference
0	Reserved	3GPP TS 29.274 [3]
1	International Mobile Subscriber Identity (IMSI)	3GPP TS 29.274 [3]
2	Cause	3GPP TS 29.274 [3]
3	Recovery (Restart Counter)	3GPP TS 29.274 [3]
4-50	Reserved for S101 interface	3GPP TS 29.274 [3]
51	STN-SR	6.2
52	Source to Target Transparent Container	6.3
53	Target to Source Transparent Container	6.4
54	MM Context for E-UTRAN SRVCC	6.5
55	MM Context for UTRAN SRVCC	6.6
56	SRVCC Cause	6.7
57	Target RNC ID	6.8
58	Target Global Cell ID	6.9
59	TEID-C	6.10
60-70	For future Sv interface use	-
71-73	Reserved for GTPv2	3GPP TS 29.274 [3]
74	IP Address	3GPP TS 29.274 [3]
75	Mobile Equipment Identity (MEI)	3GPP TS 29.274 [3]
76	MSISDN	3GPP TS 29.274 [3]
77-254	Reserved for GTPv2	3GPP TS 29.274 [3]
255	Private Extension	3GPP TS 29.274 [3]

6.2 STN-SR

STN-SR is transferred via GTP tunnels. The sending entity copies the value part of the STN-SR into the Value field of the STN-SR IE. STN-SR is defined in 3GPP TS 23.003 [4].

Octets	Bits 8	7	6	5	4	3	2	1
1	Type = 51 (decimal)							
2 to 3	Length = n							
4	Spare				Instance			
5 to (n+4)	STN-SR							

Figure 6.2-1: STN-SR

6.3 Source to Target Transparent Container

The Source to Target Transparent Container contains RAN/BSS parameters that are necessary for the target radio access network to setup radio bearer. When target network is GERAN, this container carries the *Old BSS to New BSS Information* IE defined in 3GPP TS 48.008 [8]. When target network is UTRAN, this container carries the *Source RNC to Target RNC Transparent Container* IE defined in 3GPP TS 25.413 [9]. The Transparent container field includes the IE value part as it is specified in the respective specification.

Octets	Bits 8	7	6	5	4	3	2	1
1	Type = 52 (decimal)							
2 to 3	Length = n (decimal)							
4	Spare				Instance			
5	Length of the Transparent container							
6 to (n+3)	Transparent container							

Figure 6.3-1: Source to Target Transparent Container

6.4 Target to Source Transparent Container

The Transparent container field includes the IE value part as it is specified in the respective specification.

Octets	Bits 8	7	6	5	4	3	2	1
1	Type = 53 (decimal)							
2 to 3	Length = n							
4	Spare				Instance			
5	Length of the Transparent container							
6 to (n+4)	Transparent container							

Figure 6.4-1: Target to Source Transparent Container

6.5 MM Context for E-UTRAN SRVCC

The MM Context information element contains mobile station classmarks, supported codec list, and the security parameters that are necessary for the MSC server to setup the ciphering connection (and integrity protection for 3G) with the target access for SRVCC. CS ciphering keys parameters: CK_{SRVCC}, $IK_{SRVCC,}$ and eKSI for E-UTRAN SRVCC are defined in 3GPP TS 33.401 [6]. Mobile Station Classmark 2, Mobile Station Classmark 3, and Supported Codec List information Elements indicates the supported encryption algorithm for GERAN access and CS supported codec. The coding of Mobile Station Classmarks and Supported Codec List fields include the IE value part as it is specified in 3GPP TS 24.008 [7].

Octets	Bits 8	7	6	5	4	3	2	1
1	Type = 54 (decimal)							
2 to 3	Length = n							
4	Spare				Instance			
5	Spare					eKSI		
6 to 21	CK_{SRVCC}							
22 to 37	IK_{SRVCC}							
38	Length of the Mobile Station Classmark 2							
39 to a	Mobile Station Classmark 2							
b	Length of the Mobile Station Classmark 3							
(b+1) to c	Mobile Station Classmark 3							
d	Length of the Supported Codec List							
(d+1) to (n+4)	Supported Codec List							

Figure 6.5-1: MM Context for E-UTRAN SRVCC

6.6 MM Context for UTRAN SRVCC

The MM Context information element contains mobile station classmarks, supported codec list, and the security parameters that are necessary for the MSC server to setup the ciphering connection (and integrity protection for 3G) with the target access for SRVCC. The usage of $CK"_{CS}$, $IK"_{CS}$, $KSI"_{CS}$, Kc", $CKSN"_{CS}$ are defined in 3GPP TS 33.102 [10].

Mobile Station Classmark 2, Mobile Station Classmark 3, and Supported Codec List information Elements indicates the supported encryption algorithm for GERAN access and CS supported codec. The coding of Ciphering Key Sequence Number, Mobile Station Classmarks, and Supported Codec List fields include the IE value part as it is specified in 3GPP TS 24.008 [7]

Octets	Bits 8	7	6	5	4	3	2	1
1	Type = 55 (decimal)							
2 to 3	Length = n							
4	Spare				Instance			
5	Spare				$KSI"_{CS}$			
6 to 21	$CK"_{CS}$							
22 to 37	$IK"_{CS}$							
38 to 45	Ciphering Key (Kc)							
46	$CKSN"_{CS}$							
47	Length of the Mobile Station Classmark 2							
48 to a	Mobile Station Classmark 2							
b	Length of the Mobile Station Classmark 3							
(b+1) to c	Mobile Station Classmark 3							
d	Length of the Supported Codec List							
(d+1) to (n+4)	Supported Codec List							

Figure 6.6-1: MM Context for UTRAN SRVCC

6.7 SRVCC Cause

SRVCC Cause IE is coded as this is depicted in Figure 6.7-1.

Octets	Bits 8	7	6	5	4	3	2	1
1	Type = 56 (decimal)							
2 to 3	Length = 1							
4	Spare				Instance			
5	SRVCC Cause value							

Figure 6.7-1: SRVCC Cause

The SRVCC Cause value indicates the reason for cancellation or the rejection of the SRVCC PS to CS Request.

Table 6.7-1: SRVCC Cause values

Cause value (decimal)	Meaning
0	Reserved. Shall not be sent and if received the Cause shall be treated as an invalid IE
1	Unspecified
2	Handover/Relocation cancelled by source system
3	Handover /Relocation Failure with Target system
4	Handover/Relocation Target not allowed
5	Unknown Target ID
6	Target Cell not available
7	No Radio Resources Available in Target Cell
8	Failure in Radio Interface Procedure
9-255	Spare. This value range is reserved for SRVCC Cause values

6.8 Target RNC ID

This IE shall contain the identity of the target RNC. The encoding of this IE is defined in 3GPP TS 29.002 [11].

Octets	Bits 8	7	6	5	4	3	2	1
1	Type = 55 (decimal)							
2 to 3	Length = n (decimal)							
4	Spare				Instance			
5 to (n+4)	RNC ID							

Figure 6.8-1: Target RNC ID

6.9 Target Global Cell ID

This IE shall contain the identity of the target GSM Cell ID. The encoding of this IE is defined in 3GPP TS 29.002 [11].

Octets	Bits 8	7	6	5	4	3	2	1
1	Type = 56 (decimal)							
2 to 3	Length = n (decimal)							
4	Spare				Instance			
5 to (n+4)	Cell ID							

Figure 6.9-1: Target Cell ID

6.10 Tunnel Endpoint Identifier for Control Plane (TEID-C)

Tunnel Endpoint Identifier for Control Plane (TEID-C) is coded as depicted in Figure 6.x-1.

Octets	Bits 8	7	6	5	4	3	2	1
1	Type = 59 (decimal)							
2-3	Length = 4 (decimal)							
4	Spare				Instance			
5-8	Tunnel Endpoint Identifier for Control Plane (TEID-C)							
9-(n+4)	These octet(s) is/are present only if explicitly specified							

Figure 6.10-1: Tunnel Endpoint Identifier for Control Plane (TEID-C)

Annex A (informative): Change history

Date	TSG #	TSG Doc	CT4 Doc	CR	Rev	Cat	Subject/Comment	Old	New
2008-12	CT#42	CP-080715					V2.0.0 approved in CT#42	2.0.0	8.0.0
2009-03	CT#43	CP-090047	C4-090919	0001	3	F	Finalizing Sv spec	8.0.0	8.1.0
2009-09	CT#45	CP-090544	C4-091655	0003			Definition of TEID-C IE	8.1.0	8.2.0
2009-09	CT#45	CP-090544	C4-091860	0004			Cleanup of ENs		
2009-09	CT#45	CP-090544	C4-092117	0005	2		HSPA security parameter alignment		

History

Document history		
V8.0.0	January 2009	Publication
V8.1.0	April 2009	Publication
V8.2.0	October 2009	Publication